

CLAIMS

What is claimed is:

- 1 1. A method of packaging a die comprising:
2 reflowing the solder to electrically connect the die to a substrate at a first
3 temperature;
4 cooling the die and substrate to a second temperature;
5 placing a heated epoxy in contact with the die and the substrate;
6 holding the die and substrate at the second temperature for a time sufficient
7 to allow the epoxy to cure; and
8 cooling the die, substrate and epoxy.
- 1 2. The method of claim 1 wherein placing heated epoxy in contact with the die
2 and the substrate includes underfilling the space between the die and the substrate.
- 1 3. The method of claim 1 further comprising placing a lid over the die and the
2 substrate.
- 1 4. The method of claim 1 wherein placing heated epoxy in contact with the die
2 and the substrate includes overmolding the die.
- 1 5. The method of claim 1 wherein after reflow, the die and substrate remain
2 above or at the second temperature until the epoxy cures.
- 1 6. The method of claim 1 wherein the second temperature is sufficiently lower
2 than the first temperature to allow the reflowed solder to solidify.
- 1 7. The method of claim 1 further including selecting an epoxy that cures at a
2 temperature near the temperature associated with reflow of the solder.

1 8. The method of claim 1 further comprising selecting a solder that does not
2 leave a residue as a result of reflow.

1 9. A process for assembling a package for a semiconductor device comprising:
2 reducing the stress in an inner dielectric layer during packaging by
3 heating the die and the substrate to a temperature where the solder
4 reflows;
5 dropping to a temperature where a selected epoxy will cure;
6 liquefying the epoxy;
7 adding the liquefied epoxy to the die and substrate; and
8 maintaining the die and substrate at a temperature where the epoxy
9 cures for a selected amount of time.

1 10. The process of claim 9 further comprising adding a flux that leaves reduced
2 amounts of residue after heating the die and solder to a temperature where the solder
3 reflows.

1 11. The process of claim 9 wherein the steps of cleaning the die of excess flux
2 residue and driving off the excess liquid are eliminated.

1 12. The process of claim 9 wherein adding the liquefied epoxy to the die and
2 substrate includes underfilling the space between the die and substrate with
3 liquefied epoxy.

1 13. The process of claim 12 wherein capillary action is used in underfilling the
2 space between the die and the substrate.

1 14. The process of claim 12 wherein the epoxy is pressurized and injected into
2 the space between the die and the substrate in underfilling the space between the die
3 and the substrate.

1 15. A system for forming a semiconductor package comprising:
2 a solder reflow station that heats a die and a substrate to reflow solder so that
3 the die is electrically connected to the substrate, the reflow station operating at least
4 at a first temperature that allows solder to reflow; and
5 a station for placing material in contact with at least a portion of the die at a
6 second temperature, the second temperature less than the first temperature wherein
7 the die and substrate are heated to the first temperature and cooled to the second
8 temperature without cooling the die and substrate to a temperature significantly
9 below the second temperature between the solder reflow station and the station for
10 placing material in contact with at least a portion of the die.

1 16. The system of claim 15 wherein the station for placing material in contact
2 with at least a portion of the die includes a device for placing a heated epoxy in
3 contact with the die and the substrate.

1 17. The system of claim 15 wherein the station for placing material in contact
2 with at least a portion of the die includes a device for underfilling the space between
3 the die and the substrate with a heated epoxy.

1 18. The system of claim 15 wherein the station for placing material in contact
2 with at least a portion of the die includes a device for underfilling the space between
3 the die and the substrate with a heated epoxy using capillary action.

1 19. The system of claim 15 wherein the station for placing material in contact
2 with at least a portion of the die and the solder reflow station are at a single location.

1 20. The system of claim 15 further comprising a curing station for wherein the
2 station for holding the die and substrate at the second temperature for a time
3 sufficient to allow the epoxy to cure.

1 21. The system of claim 20 wherein the station for placing material in contact
2 with at least a portion of the die, the solder reflow station, and the curing station are
3 at a single location.

1 22. The system of claim 15 further comprising a curing station for wherein the
2 station for holding the die and substrate at a curing temperature for a time sufficient
3 to allow the epoxy to cure, the die and substrate held at a temperature at least equal
4 or above the curing temperature at the solder reflow station and at the station for
5 placing material in contact with at least a portion of the die.

1 23. The system of claim 22 wherein the station for placing material in contact
2 with at least a portion of the die, the solder reflow station placing material, and the
3 curing station are at a single location.